DESIGN SPECIFICATION FOR A MERGING PROGRAM FOR FORMATTED IMAGE DATA FILES

Job Order 71-695

TIRF 78-0020

Prepared By

Lockheed Electronics Company, Inc.

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For

EARTH OBSERVATIONS DIVISION

SCIENCE AND APPLICATIONS DIRECTORATE

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1. SCOPE

This specification describes the proposed design for a general file merge program to merge Universal or LARSYS files. The program is intended to provide a means of concatenating MSS image data from different sources (tapes, disk files, and so on) into data files for use by pattern recognition systems such as EOD-LARSYS.

The requirements statement for this program was provided as a joint venture among the following constituents:

- The RT&E Branch of the NASA/JSC Earth Observations Division,
- The Scientific Applications Section (LEC),
- The Techniques Development Section (LEC),
- The Laboratory for the Applications of Remote Sensing at West Lafayette, Indiana.

2. APPLICABLE DOCUMENTS

- Interdepartment Communication, K. H. Ahlers to P. J. Aucoin, March 1, 1978, Ref: 642-6805.
- TIRF 78-0020, "Image Merge Capability", May 1978.
- Technical Memorandum "Final Acceptance Test Plan for the EOD-LARSYS Conversion", Ref: 646C-13, March 1978.

3. SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

Not Applicable.

3.2 SOFTWARE DESCRIPTION

The software program described herein will furnish a general capability to merge formatted MSS data files into files suitable for input to pattern recognition systems such as EOD-LARSYS. Up to six files will be handled in the same merge. Merging will be accomplished, on user option, in any one of the following three ways:

- Channel merge, whereby specified channels from selected files are concatenated. One rectangular spatial field will be user-specified, this field will be used in the extraction of data from all input files,
- Spatial merge, whereby specified rectangular fields are abutted to form a larger spatial image. Each input field must have the same number of channels; however, the choice of channels from each field is user-specified,
- Line merging, whereby user-specified scan lines from up to six input files are stacked to make an artificial, or "pseudo" image. All scan lines must have the same length, ie., contain the same number of pixels. Channel selection from each input file is arbitrary, with the restriction that the number of channels from each file is constant.

  Up to 30 channels can be specified for the output file. It can be written in either Universal or Larsys II format. However, special header information, such as date and site, will only be written for Universal format.

  All merging is based on user-specified rectangular fields. For purposes of extraction, it is assumed that the sample

co-ordinate of the first pixel in each scan line is 1. In the spatial merge option, rectangular input fields other than the upper left field should be input this way for purposes of extraction.

The output file will have a rectangular field, with line and sample skip factors set to the value 1 and the first pixel co-ordinates set to (1,1).

Merged channels will be renumbered starting with the value 1. Channels are merged in the order of appearance in input control cards.

Sun angles will be extracted from header records or, on option, read in from control cards. Gains and biases will be unpacked for appropriate channels. Sun angle corrections will be performed on option to all pixels making up the output file.

In the case of channel merge with Universally formatted output, sunangles and gains and biases are written to the output header. In any output file with Universal format, the date and site from the first input file will be written to the output file header. In gains and biases and sunangle extraction, it is assumed that the first channel on any input file is channel number 1.

The merge program described herein will be incorporated into the EOD-LARSYS system currently implemented at Purdue-LARS. (This system, which has been converted from UNIVAC EXEC 2 to IBM 370/148 Fortran IV-G under VM/CMS is being run from remote terminals at LEC and NASA/JSC). The merge program will be installed as a processor, called using processor card $DAMRG.

It will be run as a stand-alone processor, or back-to-back with other processors.

The proposed merge program will have particular utility in merging the single acquisition (four channel) files of the RT&E Data Base at Purdue-LARS.

A general description of the proposed program design follows. In particular, labeled common blocks and data passage will be discussed.

The merge program will have the overall architecture of an EOD-LARSYS processor. As such, it will consist of a main program called from the monitor routine, and it will call a small setup routine to read control cards, field cards, and perform initialization of variables. Many of the existing EOD-LARSYS utilities will be utilized, a partial list includes the MSS data file readers and writers, the field card reader LAREAD, the direct access file readers and writers, and the decoders used in interpreting control cards.

The main driver will be called DAMRG. It will call SET18 to read control cards and field cards.

Existing labeled common blocks /GLØBAL/, /TAPERD/, / ISØLNK /, and /WRTAP/ will be included in both DAMRG and SET18 to facilitate information transfer. In particular, the variables of interest in each block are now listed.

/GLØBAL/

DRUMAD	starting address of random direct access file
NCHPAS	number of channels per acquisition (usually = 4)
DATAPE	output unit number (usually 11)
DATAFIL	output file number (usually 1)
CRDUNT	unit number of control card file (usually 21)

PRTUNT	printer unit number (usually 6)
RANDIO	unit number of direct access file (usually 22)
FORMT	format of input files (=1 if Universal, =2 if LARSYS III)

/TAPERD/

ID(200)	contains header information. A variable LOGICAL*1 IDL(800) will be equivalenced for byte transfers
NSAMP	number of samples/line for field

/WRTAP/

VARBL(18)	information for writing output header. This will be changed to VARBL(600). A variable LOGICAL*1 VARIAB(2400) will be equivalenced to VARBL to pass sun angles, gains and biases, and site and date.

/ISOLNK/

ISUNT	switch to unpack sun angles from file and store
ISUNC	switch to use card input sun angles
SUNANGLE(8)	sunangles for one file (up to 8) A variable LOGICAL*1 LOGSUN(32) will be equivalenced for data transfer at the byte level.

A new labeled common block /MRGDAT/ will be provided for inclusion in DAMRG and SET18. All variables in /MRGDAT/ will be initialized in SET18. A list of /MRGDAT/ variables follows.

/MRGDAT/	Labeled Common Block:
Variable	Description
IMΦPT	option switch, = 1 channel merge, =2 spatial merge, = 3 pseudo merge
ISΦPT	sun angle correction switch, = 0 no sun angle correction applied to output pixels.
NUMFIL	number of input files, determined by counting DATAPE input control cards.
IDATTP(6) IDATFL (6)	unit and file numbers of input files
NΦFEAT	number of channels for output file
NFEAT(6)	number of channels to be considered for input files
FETVEC(30,6)	channel numbers for input files
ISUN(8,6)	sun angles of interest from input files
SUNCΦR(30)	sun angle correction factor (floating point) for output pixels
FLDINF(6,6)	rectangular field description for input files (starting line number, ending line number, line skip factor, starting sample number, ending sample number, skip factor)
NΦSAMP	number of pixels/scan line on output file
NΦLINE	number of lines on output file
NSS(6)	number of samples/line on input fields in spatial option
NACRΦS	number of fields in horizontal direction in spatial merge option
NLINES(6)	number of lines from input files in psuedo option

LINPTR(7)	Pointer to LINES
LINES(600)	line numbers from input files in psuedo merge option
FΦRMM	format of output file (=1 Universal, =2 LARSYS III)

Blank common ARRAY (TΦP) and TΦP = 10600 are passed to DAMRG through the calling sequence.

The control card images and field card images required to be furnished are described next. This card image file is provided by the user. It is read by SET18.

- NEW CONTROL CARDS

$DAMRG

Keyword	Parameters	Description
(start in col. 1)	(start in col. 11)	
NCPASS	n (Default n=4)	number of channels per acquisition
FΦRMAT	UNIVERSAL or LARSYS II or III (Default UNIVERSAL)	format of output data file
DATE		alpha date info
HED1	(Default-LYNDON B. JOHNSON SPACE CENTER)	alpha header information for printout
HED2	(Default-HOUSTON, TEXAS)	
NLIN	$n_1, \ldots, n_{NUMFIL}$	number of lines from each file in psuedo option

$DAMRG Keyword		Parameters	Description
	ØPTIØN	CHANNEL or SPATIAL or PSUEDØ (Default CHANNEL)	merging option
	ØPTIØN	ANGCØR (Default no sunangle correction	sunangle correction applied to output pixels
	NACROS	n	In spatial option, number of fields to be abutted horizontally
	SUNANG or	TAPE	sunangles extracted from tape headers
NUMFIL CARDS	SUNANG	$n_1, \ldots, n_{m_1}$ //	or from input cards
	SUNANG	$n_1, \ldots, n_{m_{NUMFIL}}$	
NUMFIL CARDS	DATAPE	INPUT/UNIT=n_1, FILE=m_1 //	Fortran unit #s and file #s for input files
	DATAPE	INPUT/UNIT=n_{NUMFIL}, FILE=m_{NUMFIL} (No default)	
	DATAPE	ØUTPUT/UNIT = n, FILE=m (Default n=11, m=1)	unit # and file # for output file
NUMFIL CARDS	LINES	$n_1, \ldots, n_1$ //	In psuedo option, scan line numbers for extraction from files
	LINES	$n, \ldots, n_{NØLINE}$	
	CHAN . . .	$n_1, \ldots, n_{m_1}$	
	CHAN	$n_1, \ldots, n_{m_{NUMFIL}}$	
	*END		control card delimitor

- FIELD CARDS

There will be one field description if the channel or psuedo merging option is specified. If the spatial option is specified, there must be as many field descriptions there as DATAPE input file control cards (i.e. NUMFIL fields).

Fields must be rectangular. Information specified, in order, is

sample skip factor
line skip factor
starting sample number
starting line number
ending sample number
starting line number
ending sample number
ending line number
starting sample number
ending line number

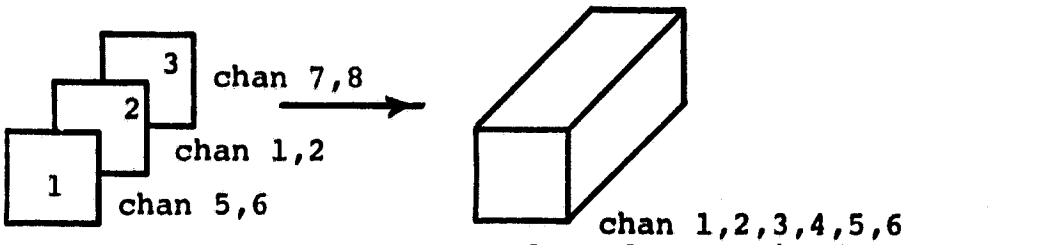
Field descriptions start in column 11, with a comma between number pairs and parentheses enclosing number pairs, with commas separating parentheses.

For example, a LACIE segment might appear as (1,1), (1,1) (196,1), (196,117), (1,117), where the first parenthesis is located in column 11 (or further right).

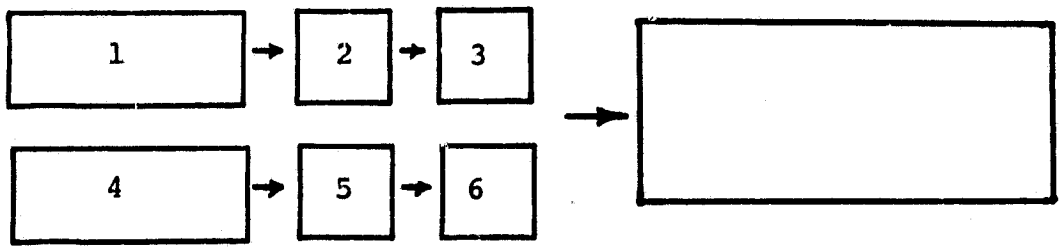
Field card input is terminated by a $END card image starting in col.1.

MERGING OPTIONS

CHANNEL MERGE



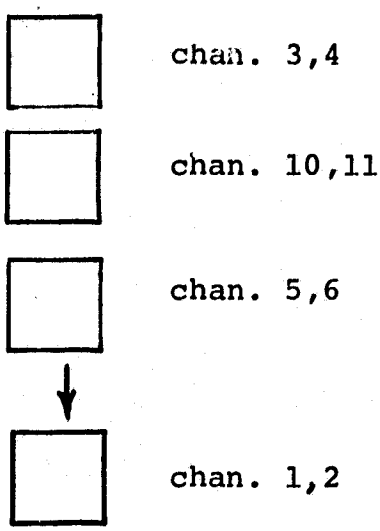
SPATIAL MERGE



Numbers indicate order of input of file descriptors and field cards.

NACRØS=3

PSEUDO MERGE



There is a limitation of 10600 radiance values per scan line in the currently proposed programs.

This can be expanded by request of the Scientific Applications Section.

The program to be described uses the following design features of EOD-LARSYS:

- Byte-to-word unpacking in the file reader and word-to-byte packing in the file writer,
- Simulation of word-addressable mass storage using a Fortran direct access disk file.

  Collection of all data destined for the output file on the direct access file is planned for this program. LACIE segments can be handled this way with no storage limitations. Howev for output files intended to have more than a million radiance values, a storage problem will occur. To handle this situation, a program extension is planned to use tape as the intermediate storage medium.

  Throughout this document, the terms LARSYS II and LARSYS III will be used interchangeably when reference is made to the Purdue-LARS data file format.

3.2.1 SOFTWARE COMPONENT NO.1 (DAMRG)

Subroutine DAMRG will be the driver for the DAMRG processor. It calls routine SET18 to obtain decoded input data, then processes each input file in order of occurence in the control card file.

Extracted information is written to a random access disc file. Finally, the output file is written one scan line at a time.

3.2.1.1 Linkages

Subroutine DAMRG will be called by the EOD-LARSYS driver MONTOR, and will call routines SET18, TAPHOR, FLDINT, LINERD, SUNFAC, FSFMFL, WRTHED, WRTLN, RREAD, and RWRITE.

3.2.1.2 Interfaces

Subroutine DAMRG interfaces with other routines through labeled common /GLØBAL/, /TAPERO/, /MGRDAT/, /WRTAP/, /ISØLNK/, and blank common ARRAY (TØP), TØP=10600.

3.2.1.3 Inputs

Calling sequence: DAMRG (ARRAY, TØP)

Parameter	Dimension	Description
ARRAY	TØP	General storage or buffer area for pixel radiance values, stored one value per word.
TØP	1	Current dimension of ARRAY.

3.2.1.4 Outputs

Routine DAMRG outputs an MSS data file in either Universal or LARSYS III format.

3.2.1.5 Storage

TBD

3.2.1.6 Description

The description of subroutine DAMRG will be presented as FORTRAN-like statements. To be included are appropriate output statements describing progress through the file building and diagnostics as required.

```
      SUBRØUTINE DAMRG (ARRAY, TØP)

      IMPLICIT INTEGER (A-Z)
      REAL SUNCØR, DUM
      LØGICAL*1 IDL(800), VARIAB(2400), LØGSUN(32)

      EQUIVALENCE (ID,IDL), (VARBL,VARIAB), SUNANG,LØGSUN)
      include /GLØBAL/, /TAPERD/, /WRTAP/, /ISØLNK/,/MRGDAT/
      CALL SET18
C**   MAJOR LOOP ON FILES
      N1=0
      DØ 700 I=1, NUMFIL
C**   CALL TAPE HEADER READ PROGRAM WITH UNIT AND FILE

      IDATU = IDATTP(I)
      IDATF = IDATFL(I) -1
      CALL TAPHDR (IDATU,IDATF)
C**   NUMBER OF CHANNELS FOR THIS FILE
      NF=NFEAT(I)
      CALL FLDINT (FLDINF(1,I), FETVEC (1,I), NF)
C**   SET FEATURE COUNTER
      IF (I.GT.1) N1=N1+NFEAT(I-1)
C**   SET SCALAR FIELD DESCRIPTION FOR THIS FILE
      SAMSTR = FLDINF (4,I)
      SAMINC = FLDINF (6,I)
      SAMEND = FLDINF (5,I)
      LINSTR = FLDINF (1,I)
      LININC = FLDINF (3,I)
      LINEND = FLDINF (2,I)

C**   NO. SAMPLES/LINE FOR FILE I COMPUTED IN FLDINT

      NS=NSAMP

C**   TOTAL NUMBER OF RADIANCE VALUES PER LINE
      NV=NS*NF
```

```
C**    STORE SUNANGLES

       IF (ISUNT.NE.0) GΦ TΦ 610
       IF (ISUNC.EQ.0) GΦ TΦ 620
C**    SUN ANGLES FROM CARDS
       DΦ 600 J=18
       ID(16+J) = ISUN(J,I)
600    SUNANG(J) =ISUN(J,I)
       GΦ TΦ 620

C**    SUNANGLES FROM TAPE HEADER
610    DΦ 615 J=1,8

       ISUN(J,I) = SUNANG(J)

615    CONTINUE
       CALL SUNFAC(SUNCOR, SUNANG, FETVEC(1,I),NF, ISUNT, ISUNC)
620    CONTINUE

C**    LOAD VARIAB WITH EXTRA HEADER INFO
C**    LOAD DATE AND SITE FROM FIRST FILE

       IF (I.NE.1) GΦ TΦ 625

       VARIAB(73) = IDL(100)
       VARIAB(74) = IDL(104)
       VARIAB(75) = IDL(108)
       VARIAB(79) = IDL(111)
       VARIAB(80) = IDL(112)

C**    FOR PURPOSES OF UNIVERSAL HEADER WRITE
C**    LOAD VARIAB WITH SUNANGLES AND GAINS AND BIASES
C**    ONLY IF CHANNEL MERGE OPTION
625    IF (IMOPT,NE.1) GΦ TΦ 660

       DΦ 650 J=1,NF

       IDUM = (FETVEC(J,I)-1)*2
       I1=112+IDUM ; I2=112+N1*2+(J-1)*2
       VARIAB (I2) = IDL (I1+3)
       VARIAB (I2+1) = IDL (I1+4)

       I1 = 240+IDUM; I2 = 240+N1*2+(J-1)*2
       VARIAB(I2) = IDL(I1+3)
       VARIAB(I2+1) = IDL(I1+4)

       I1 = 368+IDUM; I2 = 368+N1*2+(J-1)*2
       VARIAB(I2) = IDL(I1+3)
       VARIAB (I2+1) = IDL(I1+4)

       I1 = 496+IDUM; I2 = 496+N1*2+(J-1)*2
       VARIAB (I2) = IDL (I1+3)
       VARIAB (I2+1) = IDL(I1+4)
```

```
650   CONTINUE

      KS=0
      DO 655 J=1,NF


      IDUM=FETVEC(J,I)

      IDUM=(IDUM-1)/NCHPAS

      IF (ISUNT.EQ.0.AND.J.EQ.1) KS=IDUM

      I1 = (IDUM-KS)*4+3
      I2 = 2201+(N1+J-1)*2

      VARIAB(I2) = LOGSUN(I1)
      VARIAB(I2+1) = LOGSUN (I+1)

655   CONTINUE

660   CONTINUE

C**   INITIALIZATION FOR LINE EXTRACTION
C**   PARAMETERS NEEDED IF SPATIAL MERGE
      LOC = (I-1)/NACROS

      LREM = (I-1) - LOC*NACROS
      N2=0
      IF (LREM.EQ.0) GO TO 663

      DO 662 J=1,LREM
622   N2=N2+NSS(J)

663   ICT=0
C**   PARAMETERS NEEDED IF PSEUDO MERGE OPTION
      LPTR = LINPTR(I)
      NL = NLINES(I)
      NLM = NL+LPTR-1

CC**  EXTRACT FIELD FOR THIS FILE LINE BY LINE

      DO 690 II = LINSTR, LINEND, LININC

      ICT=ICT+1
      IF(IMOPT.NE.3) GO TO 670

C**   LOOK FOR LINE MATCH IF PSEUDO MERGE

      DO 655 J = LPTR, NLM

      IF (II.EQ.LINES(J)) GO TO 670
665   CONTINUE
      GO TO 690

670   CONTINUE

C**   READ SCAN LINE INTO ARRAY

      CALL EINERD (ARRAY(1),ENDTAP)

      IF(ENDTAP.EQ.-1) error out, end of tape
```

```
      IF (IMØPT.NE.1) GØ TØ 675
C**   CHANNEL MERGE MODE WRITE NV VALUES
C**   TO DIRECT ACCESS FILE

      IF (ISØPT.EQ.0) GØ TØ 672

C**   DØ SUN ANGLE CORRECTION

      DØ 671 J=1, NF
      DØ 671 JJ=1,NS

      DUM = SUNCØR(J)*FLOAT(ARRAY(JJ+(J-1)*NS))
      ARRAY(JJ+(J-1)*NS) = IFIX(DUM)
671   CØNTINUE
672   ADDRESS = DRUMAD+(ICT-1)*NS*N1
      CALL RWRITE (ADDRESS, ARRAY(1), NV, STATUS)
      GØ TØ 690

675   IF (IMØPT.NE.2) GØ TØ 680
C**   SPATIAL MERGE MODE WRITE NV VALUES
      TO DIRECT ACCESS FILE

      IF (ISØPT.EQ.0) GØ TØ 677

      DØ 676 J=1,NF
      DØ 676 JJ=1,NS

      DUM = SUNCØR(J)*FLOAT(ARRAY(JJ+(J-1)*NS))
676   ARRAY(JJ+(J-1)*NS) = IFIX(DUM)
677   CØNTINUE

      ADDRESS = DRUMAD + LØC*NOSAMP*BF + NF*N2
      CALL RWRITE (ADDRESS, ARRAY(1), NV, STATUS)
      GØ TØ 690
C**   PSEUDO MERGE OPTION
680   IF (ISØPT.EQ.0) GØ TØ 682

      DØ 681 J=1,NF
      DØ 681 JJ=1,NS

      DUM = SUNCØR(J)*FLØAT(ARRAY(JJ+(J-1)*NS))

681   ARRAY(JJ+(J-1)*NS) = IFIX(DUM)
682   ADDRESS = DRUMAD+(II-1)*NV
      CALL RWRITE(ADDRESS, ARRAY(1), NV, STATUS)
```

```
690     CONTINUE
C**     LINE LOOP COMPLETE

700     CONTINUE
C**     LOOP FOR FILE I COMPLETE

C**     WRITE OUTPUT FILE

        DATFI = DATFIL -1
C**     POSITION OUTPUT FILE

        CALL FSFMFL(DATAPE, DATFI, ISTAT)

C**     SET OUTPUT CHANNELS 1,2,...,NOFEAT
        DO 800 I=1, NOFEAT
800     FETVEC(I,1) =I
C**     WRITE HEADER OF OUTPUT FILE
        CALL WRTHED (NOFEAT, FETVEC(1,1), NOSAMP, FORMM, DATAPE)

C**     EXTRACT SCAN LINES ONE AT A TIME
C**     WRITE TO OUTPUT FILE
        LSTLIN=0
        NV=NOSAMP*NOFEAT
        DO 850 I=1, NOLINE

        IF (I.EQ.NOLINE) LSTLIN = -1

        ADDRESS = DRUMAD + (I-1)*NV

        CALL RREAD (ADDRESS, ARRAY(1), NV,ISTAT)

        CALL WRTLN (ARRAY(1), LSTLIN)

850     CONTINUE

C**     RETURN TO MONTOR
C**     OUTPUT FILE COMPLETED
            RETURN
            END
```

3.2.1.7 Flowchart

TBD

3.2.1.8 Listing

TBD

3.2.2 SOFTWARE COMPONENT NO. 2 (SET18)

Subroutine SET18 will process control and field and card images provided by the user. (These card images will be in the form of either physical cards placed in a card reader or a card image file usually created by editing on a remote on-line terminal). SET18 will cause the initial loading of all variables in the /MRGDAT/ labeled common block. In addition, the following variables from other common blocks will be loaded.
/GLØBAL/: DATAPE, DATFIL, NCHPAS
/ISØLNK/: ISUNT, ISUNC

3.2.2.1 Linkages

Subroutine SET18 will be called once by DAMRG, and will call EOD-LARSYS routines NXTCHR, ØRDER, NUMBER, FIND12, and LAREAD.

3.2.2.2 Interfaces

Subroutine SET18 interfaces with other routines through labeled common /GLØBAL/, /TAPERD/, /WRTAP/, /MRGDAT/, and /ISØLNK/.

3.2.2.3 Inputs

Primary input to SET18 will be the control and field card file. No calling sequence is provided. The card image file is described in Section 3.2.

3.2.2.4 Outputs

N/A

3.2.2.5 Storage

TBD

3.2.2.6 Description

Subroutine SET18 will have the same overall architecture as the other setup routines in the EOD-LARSYS system, in particular, SET14 is an appropriate model. The first four characters of each control card image are stored and compared against a data array.

/'NCPA', 'FØRM', 'DATE', 'HED1', 'HED2', 'NLIN', 'ØPTI', 'NACR',
'SUNA', 'DATA', 'LINE', 'CHAN', '*END'/

When a match is found, transfer is made to the corresponding code to decode information starting at column 11.

A count will be made of all cards of the form

DATAPE INPUT/_ _ _

to determine the number of input files NUMFIL. Upon encountering the *END delimiter, the field cards will be read and decoded by repeated calls to LAREAD (one call if channel or pseudo option). The $END card delimits card input and triggers a return to DATMRG, the calling routine.

Continuation of information from one card image to another will only occur on LINES control cards (pseudo merge option). The recommended way of handling these card images is sketched as follows:

NØLINE = 0 (initially)

Upon encountering a 'LINE' card

NØLINE = NUMBER(CARD, CØL, LINES, NØLINE)

This keeps a running total of lines read in and stores line numbers in LINES. Lines associated with input files will be discerned by use of NLINES(6), the count for each file in order of input.

3.2.2.7 Flowchart

N/A

3.2.2.8 Listing

TBD

3.2.3 SOFTWARE COMPONENT NO. 3 (TAPHDR)

Subroutine TAPHDR is an EOD-LARSYS utility routine to read header records of Universal or LARSYS III formatted files.

3.2.3.1 Linkages

Subroutine TAPHDR will be called by routine DAMRG. It calls subroutine BUFILL.

3.2.3.2 Interfaces

TAPHDR interfaces with other routines through labeled common /ISØLNK/ and /TAPERD/ and a calling sequence.

3.2.3.3 Inputs

Calling sequence:

SUBROUTINE TAPHDR (DATAPE, IFILE)

Variable	Dimension	Description
DATAPE	1	Fortran unit number of file to be processed
IFILE	1	Number of files to be skipped starting at load point to reach file of interest - or, relative file number minus one.

Input to TAPHDR also includes an MSS image file.

3.2.3.4 Outputs

N/A

3.2.3.5 Storage

TBD

3.2.3.6 Description

TAPHDR will be enhanced to unpack additional information from Universal format input files.

Additions and modifications are as follows. to extract date and site:

```
DIMENSION NB(28), HWRD(28)

61, 62, 63, 67/        added to HWRD data
 8,  8,  8, 16/        added to NB data.
```

To extract gains and biases:

```
40      ILIM=156
        remove the ISUNT tost for ILIM

        IWD = 112+(I-29)*4
        IF (I.LT.29) IWD = HWRD(I)

        NBYTES = 4
        IF (I.LT.29) NBYTES = NB(I)/8

        remove ILIM test for storage of
               sunangles in SUNANG(8) and
               replace with ISUNT.NE.0 requirement.
```

3.2.3.7 Flowchart

TBP

3.2.3.8 Listing

TBP

3.2.4 SOFTWARE COMPONENT NO. 4 (WRTHED)

Subroutine WRTHED writes the header record for a Universal or LARSYS III formatted data file. It is an EOD-LARSYS utility.

3.2.4.1 Linkages

WRTHED will be called by routine DAMRG. It calls WRTREC.

3.2.4.2 Interfaces

WRTHED interfaces with other routines through labeled common /WRTAP/ and a calling sequence.

3.2.4.3 Inputs

Calling sequence:

SUBROUTINE WRTHED (NCHAN, FEAT, NSAMP, FRMAT, IUNIT)

Variable	Dimension	Description
NCHAN	1	number of channels to be written
FEAT	NCHAN	channel numbers
NSAMP	1	number of pixels per line
FRMAT	1	=1 Universal, =2, LARSYS III
IUNIT	1	Fortran unit number for output

3.2.4.4 Outputs

WRTHED provides the first record of an output data file.

3.2.4.5 Storage

TBD

3.2.4.6 Description

The output header will be enhanced to provide more information. Information is unpacked from the VARBL(600) variable in the /WRTAP/ common block.

Additions and changes will be as follows.

```
LOGICAL*1 VARIAB(2400)
EQUIV (VARBL(1), VARIAB(1))

PACRAY(I)=VARIAB(I), I= 73, 74, 75, 79, 80
(This stores the date and site number)
DO 110 L=1,512
110 PACRAY (111+L) = VARIAB (111+L)
(This stores gains and biases).
DO 120 L=1,16
120 PACRAY (2200+L) = VARIAB(2200+L)
(This stores sun angles).
```

These additional variables are only provided if the Universal format is chosen.

3.2.4.7 Flowchart

N/A

3.2.4.8 Listing

TBD

3.2.5 SOFTWARE COMPONENT NO. 5 (MSCAN)

Subroutine MSCAN is part of the EOD-LARSYS monitor system. It reads processor control cards and informs MONTOR as to which processor to call.

3.2.5.1 Linkage

Routine MSCAN is called by routine MONTOR. It calls the re-read facility.

3.2.5.2 Interfaces

MSCAN interfaces with other routines through common blocks /GLOBAL/ and, recently, /TAPERD/. (The /TAPERD/ block was added to set the input format parameter FØRMT =1 or 2 (Universal or LARSYS II)). A calling sequence is provided.

3.2.5.3 Inputs

Calling sequence:

SUBROUTINE MSCAN (MGØ, DBUG)

Variable	Dimension	Description
MGØ	1	Sequence number of processor list for use by MONTOR
DBUG	1	Initial call flag
• FØRM	New Control CARDS n (default n=1)	n=1 all formatted input files are Universal, n=2, LARSYS III

3.2.5.4 Outputs

N/A

3.2.5.5 Storage

TBD

3.2.5.6 Description

The variable FØRMT in /TAPERD/ will be set to 1 or 2 based on the control card FØRM. This specifies the format of all input formatted files in an execution of the EOD-LARSYS system. The FØRM card must be the first card in the card image file presented to the EOD-LARSYS system.

In order to provide for inclusion of the new processor DAMRG, the data variable '$DAM' must be inserted between '$LAB' and '$EXI' in the CØDTAB vector. The dimension of CØDTAB must be expanded to 16, and, correspondingly CØDDEM set to 16.

3.2.5.7 Flowchart

N/A

3.2.5.8 Listing

TBD

3.2.6 SOFTWARE COMPONENT NO. 6 (MONTOR)

Routine MONTOR calls the processors of the EOD-LARSYS system.

3.2.6.1 Linkage

MØNTØR is the main program of the EOD-LARSYS system. It calls subroutine MSCAN and processors STAT, CLSFY, DSPLAY, SELECT, HIST, ISØCLS, GRAYMP, DATATR, TRSTAT, NDHIST, SCTRPL, DØTDAT, LABEL, and will call DAMRG.

3.2.6.2 Interfaces

MØNTØR interfaces with other routines through common block /GLØBAL/, and blank common ARRAY(TØP),TØP=10600.

3.2.6.3 Inputs

N/A

3.2.6.4 Outputs

N/A

3.2.6.5 Storage

TBD

3.2.6.6 Description

Provision for the proposed processor DAMRG is made by modifying the GØ TØ statement to include location 275 between 260 and 280.

At location 275, the following code will be included.

```
275 CALL DAMRG (ARRAY,TØP)
    CALL CLØCK (TIME)
    WRITE (6,276) TIME
276 FØRMAT (// 'TIME FOR DAMRG', F10.3 ,'MINUTES')
    GØ TØ 10
```

If, for any purpose, an enlargement of the ARRAY buffer is required, this can be achieved by redimensioning ARRAY and changing TØP from 10600 to a larger number.

3.2.6.7 Flowchart

N/A

3.2.6.8 Listing

TBD

4. OPERATION

The DAMRG program will be implemented as a stand-alone processor on the EOD-LARSYS Pattern Recognition System currently installed on the Purdue-LARS 370/148 computer system. Users with sign-on numbers (IDs) can use the system by linking to the EOD-LARSYS disk. From CMS 370 this can be achieved by issuing the following commands.

```
CP LINK JSC770 191 200 R PASS=bAUCØIN
ACCESS 200 B/A
```

A card image file named FILE FT21F001 A must be available. An EXEC file must be made available to set up file definitions and allocate space, or users can build EXECs suitable for their individual needs.